

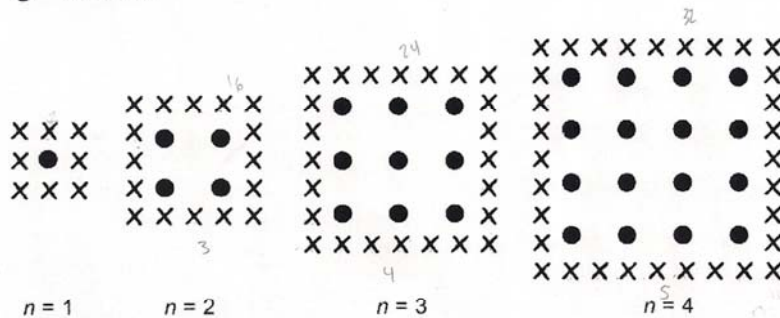
# Mathematics Task 1 – Student Samples

## Mathematics Task 1 APPLES

A farmer plants apple trees in a square pattern. In order to protect the trees from the wind he plants evergreens all around the orchard.  
The diagram below illustrates the pattern of apple trees and evergreens for any number ( $n$ ) of rows of apple trees:

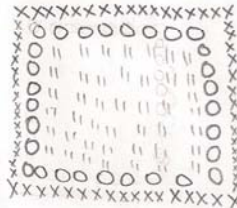


X = evergreen  
● = apple tree



If we let  $n$  be the number of rows of apple trees, find the value of  $n$  for which the number of apple trees equals the number of evergreens.

$$n = 8$$



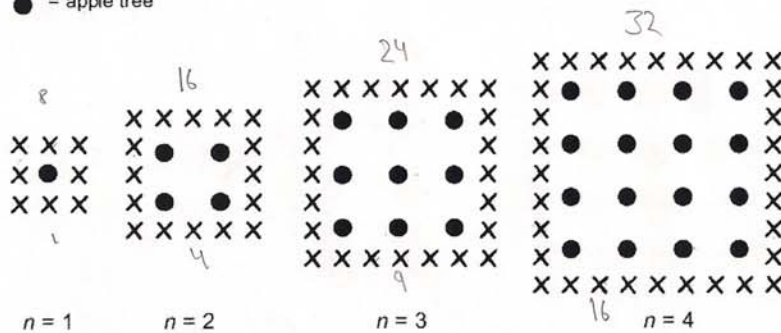
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let  $e$  represent the number of evergreens

let  $t$  represent the total number of trees

$$t = n^2 + 8n$$

# of rows

$n^2 = 8n$  ← evergreen trees

$$8^2 = 8(8)$$

$$64 = 64$$

substitute 8 for  $n$  since the pattern starts with  
 $\frac{1 \text{ row}}{8 \text{ evergreens}}$  to  $\frac{4 \text{ rows}}{32 \text{ evergreens}}$

$$1^2 = \frac{1}{8} \quad 4^2 = \frac{16}{32} \quad \text{which is half the}$$

amount we need so 4 is multiplied by 2  
 and the number 8 is tested in the  
 equation resulting in an equal number  
 of for both trees

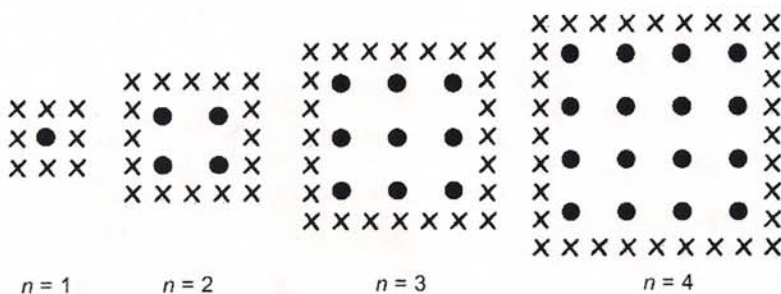
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①  $\frac{8 \text{ evergreen}}{1 \text{ apple}} = 8$   
 $n = 8$

$\frac{16 \text{ evergreen}}{2 \text{ apple tree}} = 8$

$\frac{24 \text{ evergreen}}{3 \text{ apple tree}} = 8$

$\frac{32 \text{ evergreen}}{4 \text{ apple tree}} = 8$

\* They want the number of apple tree when the number of evergreen is equal

a  
16 trees

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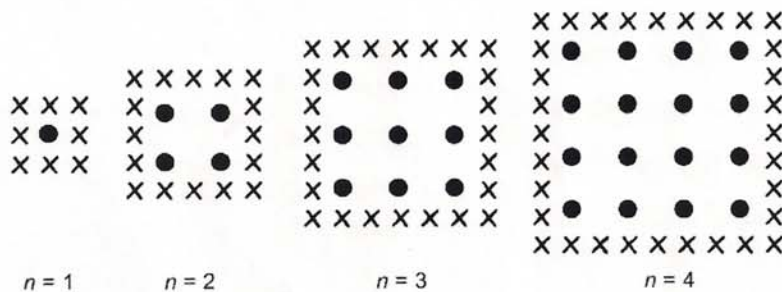
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$x$	$y$	
$n$	$m$	1 <sup>st</sup> dif
1	8	
2	16	8
3	24	8
4	32	8
5	40	

$y = mx + b$   
 $m = \frac{y_2 - y_1}{x_2 - x_1}$   
 $m = \frac{16 - 8}{2 - 1}$   
 $m = \frac{8}{1}$   
 $m = 8$

sub into  $y = mx + b$   
 $16 = 8(2) + b$   
 $16 = 16 + b$   
 $0 = b$

$y = 8x$

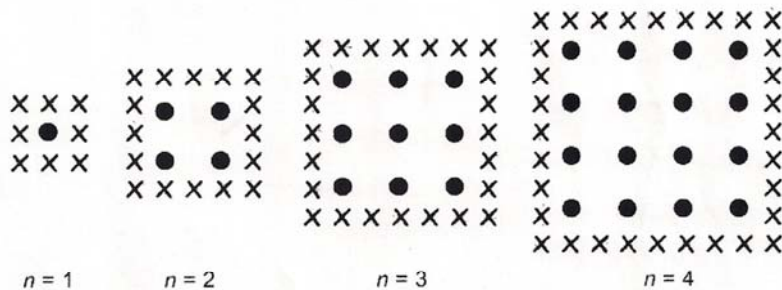
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If we let  $n$  be the number of rows of apple trees, find the value of  $n$  for which the number of apple trees equals the number of evergreens.

$x$	$y$
1	8 > 8
2	16 > 8
3	24 > 8
4	32 > 8

∴ I know that the number of trees to evergreens is a linear equation.

$x$	$y$
1	8
4	16 > 8
9	24 > 8
16	32 > 8
25	40 > 8
36	48 > 8
49	56 > 8
64	64 > 8

∴ the number of apple trees to equate the number of evergreens surrounding is 64.



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Ethan Davis

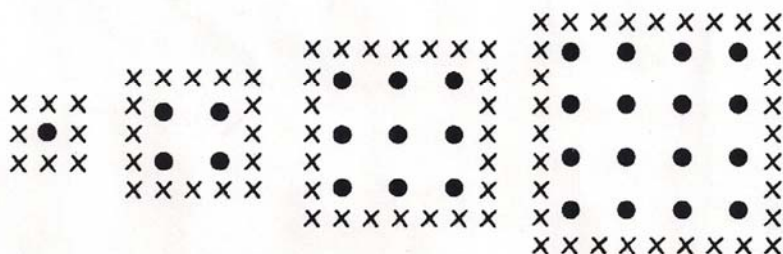
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$n = 1$   
 $X = 8$   
 $\bullet = 1$

$n = 2$   
 $X = 16$   
 $\bullet = 4$

$n = 3$   
 $X = 24$   
 $\bullet = 9$

$n = 4$   
 $X = 32$   
 $\bullet = 16$

If we let  $n$  be the number of rows of apple trees, find the value of  $n$  for which the number of apple trees equals the number of evergreens.

Every row of apples that is added, 8 more evergreens are used to build the perimeter.

X	●
40	25 (5)
48	36 (6)
56	49 (7)
64	64 (8)

$\therefore$  There would be 64 evergreens for 64 apple trees. The value of 'n' would have to be 8 to have an equilibrium of trees.